DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
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MARINE CORPS ORDER 2410.2B

From: Commandant of the Marine Corps
To: Distribution List

Subj: ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E3) CONTROL PROGRAM

Ref: (a) SECNAVINST 5000.2A
(b) American National Standard Institute (ANSI) C63.14
(c) MCO 5104.2
(d) MCO P5000.22
(e) MCO 2400.2

Encl: (1) Electromagnetic Environmental Effects (E3) Definitions
(2) Electromagnetic Interference (EMI) Hotline Instructions

1. Purpose. To publish information concerning the Marine Corps E3 Control Program; assign responsibilities to accomplish the E3 Control Program objectives; and to publish instructions for use of the EMI Hotline reporting.

2. Cancellation. MCO 2410.2A.

3. Background. The growth in recent years in the number of sophisticated electronic systems for Command, Control, Communications, Computer, and Intelligence (C4I) on the modern battlefield has resulted in new and unforeseen effects upon the electromagnetic environment. This Order implements the Secretary of the Navy policy expressed in reference (a), part 6. The Marine Corps E3 Control Program encompasses a number of disciplines which include EMI, Electromagnetic Compatibility (EMC), and Electrostatic Discharge (ESD). The Marine Corps E3 Control Program has been established to identify, assess, and control E3 deficiencies which could seriously degrade Marine Corps equipment, systems, or platforms that will affect the combat capability of the Fleet Marine Forces (FMF).

a. Definitions. Reference (b) has been adopted by the Department of Defense (DoD) to serve as a standard dictionary for definitions pertaining to E3. Commonly used E3 related definitions are listed in enclosure (1) for the convenience of the reader.

b. Program Description

(1) Mission. The Marine Corps E3 Control Program has been established to accomplish the following objectives:

(a) Assist acquisition managers in defining E3 requirements for new equipment, reprocurements, and spare parts acquisition.

(b) Identify and assist the FMF in correcting E3 problems.

(2) Objectives. The Marine Corps E3 Control Program is designed to minimize degradation due to E3 among electronic and electrical systems that are in use or intended for future use. The E3 Control Program will provide acquisition managers and operational forces the technical support required to achieve adequate E3 control, and correction of E3 deficiencies for all weapon systems or equipment (WS/E). It should be noted that this program is oriented to proper design, operation, and maintenance practices that will enhance systems combat readiness. It is not intended to provide operational guidance or doctrine for elec- tronic warfare (EW) or command and control warfare. It is related to EW measures only in regard to the fact that E3 con- trol practices assist in the electronics protection effort to retain effective friendly use of the electromagnetic spectrum. Reference (c) addresses the Marine Corps radio frequency electromagnetic field personnel protection program.

(3) Current Activities. Experience has shown that controlling E3 during the acquisition process is the most cost effective way to achieve EMC for the system. It is always more cost effective to design a system properly than to modify a fielded system. Accordingly, increased emphasis must be placed on systems under development. Current DoD activities which support this effort include:

(a) DoD Joint Spectrum Center (JSC). The Office of the Assistant Secretary of Defense has authorized the establish- ment of the JSC to support DoD E3 and Spectrum Management functions. The JSC gets its policy guidance from the Deputy Assistant Secretary of Defense; Command, Control, and Communi- cations, and operational guidance from the Joint Staff. The concept of operations is supported by the Marine Corps as the JSC will consolidate common functions within a single organization. The Marine Corps will retain control of its support to the Fleet, but will benefit from an enhanced E3 information flow through a standardized DoD E3 and spectrum management philosophy.

(b) Acquisition Reform. "Secretary of Defense Memorandum, Specifications and Standards - A New Way of Doing Business" initiated a strategy and a specific plan of action to

decrease reliance on the use of military specifications and standards in DoD procurements. It will not be acceptable to routinely reference the military specifications and standards into future procurements. In fact, government specifications and standards can only be utilized when commercial or non-government standards do not meet the services needs or are not available. If used, military specifications and standards will require waivers from the milestone decision authority. Acquisition strategy reports or acquisition plans shall address compliance with this new policy guidance.

(4) Corrective Action Program. The purpose of this program is to provide assistance to the operating forces of the Marine Corps by identifying and correcting E3 deficiencies. The method for effecting required E3 corrective action may involve any one or a combination of the following:

(a) Two mobile EMI test shelters have been developed to assess EMI problems that are encountered in the FMF.

(b) Incorporation of E3 instructions in setup, maintenance, and operational procedures.

(c) Recommend modifications that will be integrated to minimize degrading E3 on fielded WS/E.

(5) Training. The training effort will improve efficiency in the development and implementation of effective E3 control techniques at all levels within the Marine Corps. Special emphasis will be placed on user and operator; maintenance and support; and control the effects of E3 during normal operation. Years of experience in dealing with E3 control measures have demonstrated that awareness is the key to resolving E3 problem. EMC involves an understanding and application of basic electrical engineering principles. The goal of this program in regard to training is to make the most efficient use of limited resources by having training teams under the cognizance of the E3 Program Office at Commander, Marine Corps Logistics Bases (COMMARCORLOGBASES). These teams will develop training courses, and "train the trainer" at major commands and Marine Corps schools so that they in turn can conduct training.

(6) Acquisition Management Support. Reference (d)establishes acquisition management policies to achieve EMC. EMC can be achieved through proper WS/E design, testing, installation, and maintenance procedures. EMC criteria will be established as early as possible in the concept, exploration, and definition phase of the WS/E development and applied throughout the life cycle of the WS/E. To be effective, the design methodology must provide a clearly defined, coherent approach for preventing EMI problems to achieve the required EMC. This will ensure that the WS/E will operate properly in its intended electromagnetic

environment. All WS/E acquired for the Marine Corps, even those developed by another military service, are subject to this Order. Reference (e) provides information pertaining to the requirements for submission of Application for Equipment Frequency Allocation (DD Form 1494).

(7) EMI Hotline

(a) An EMI hotline telephone assistance system has been established by Commander, Marine Corps Systems Command (COMMARCORSYSCOM) (PSE), and is managed by COMMARCORLOGBASES (Code 841-4), Albany. The primary function of the system is to provide quick resolution and ready assistance to the field in reporting and resolving EMI problems as they are encountered. The Hotline does not replace current reporting requirements, but is designed as an accessory to the normal system in order to facilitate immediate attention.

(b) The hotline is available to all Marine Corps activities seeking informal technical assistance for EMI control. It is manned by a commercial firm and the telephone number is (703) 425-9666. Collect calls will be accepted 24 hours a day, seven days a week; however, the line is manned by technical per- sonnel only during working hours (0800-1700 EST), Monday through Friday. At all other times, the line will be answered by a recording service which will take the caller's name and telephone number. Contact will be made with the caller no later than the next working day. When making a hotline report, the caller should be prepared to answer the questions listed in enclosure (2). The answers to these questions provide the basic data required by engineering personnel to research a problem and get back to the caller with appropriate assistance.

4. Summary of Revision. The following are major revisions made to this Order.

a. Includes acquisition reform.

b. Updates current names, codes, and references associated with the E3 Control Program.

c. Includes information concerning the Joint Spectrum Center, which did not exist when the previous Order was published.

5. Action. The following actions are assigned to accomplish the objectives of this program. Matters involving USMC policy or issues that arise from these instructions should be referred through established command channels.

a. Headquarters Marine Corps (HQMC)

(1) Deputy Chief of Staff for Manpower and Reserve Affairs; Deputy Chief of Staff for Installations and Logistics. Maintain an E3 program point of contact for coordination of matters required by this directive. Identify the individual designated to COMMARCORSYSCOM (PSE).

(2) Deputy Chief of Staff for Aviation; Deputy Chief of Staff for Plans, Policy, and Operations; and Assistant Chief of Staff Command, Control, Communications, Computer Systems, Intelligence, and Interoperability

(a) Maintain an E3 program point of contact for co-ordination of matters required by this Order. Identify the individual designated to COMMARCORSYSCOM (PSE).

(b) Assist COMMARCORSYSCOM (PSE) in the development of E3 control techniques and procedures required for joint operation.

(3) Director, Safety Division. Maintain an E3 program point of contact for coordination of matters required by this Order. Provide policy and guidance on personnel radio frequency (RF) protection issues and permissible RF radiation exposure limits. Identify the individual designated to COMMARCORSYSCOM (PSE).

b. COMMARCORSYSCOM. The Marine Corps E3 Control Program has been established to accomplish EMC throughout the FMF. COMMARCORSYSCOM (PSE) is the sponsor of the E3 Control Program and will:

(1) Provide overall E3 control program’s policy, direction, and coordination.

(2) Interface with other DoD agencies on E3 matters.

(3) Provide direction and guidance as well as serving as the administrative owner of the E3 test shelters.

(4) Identify funding requirements for technical support for the E3 program.

(5) Ensure inclusion of E3 control requirements in all statements of work and specifications for the developmental and production type contracts. Establish quality assurance and testing procedures to ensure compliance with these requirements.

(6) After fielding, recommended E3 corrective action for equipment as needed.

(7) Ensure procurement of appropriate test equipment for effective E3 testing and assessment.

(8) Coordinate activities with the E3 points of contact that have been designated by staff sections of HQMC.

c. Commanding General, Marine Corps Combat Development Command (MCCDC)

(1) Maintain an E3 program point of contact for coordination of matters required by this Order. Identify the individual designated to COMMARCORSYSCOM (PSE).

(2) Ensure that E3 preventive measures are addressed in operational requirements documents for all WS/E being developed.

(3) Ensure all Marine Corps formal schools and training centers implement E3 individual training standards as a basis for all individuals responsible for WS/E. (Protection of ESD devices; grounding methods; identifying and reporting E3 problems; and equipment installations).

(4) Publish E3 control instructions as necessary in MCCDC publications.

d. Commanding Generals, FMF's; Marine Corps Bases, Posts, Stations, and Reserve Forces. Establish an E3 control team in each Headquarters, MEF, Division, Wing, Force Service Support Group, Base, Post, and Station. Duties for this team should include, but not limited to:

(1) Establish procedures for an E3 control program to be included in all activities involving installation, maintenance, grounding, testing, repair, assembly, and inspection of WS/E

(2) Provide assistance to units encountering E3 control problems.

(3) Conduct E3 control related awareness training in support of formal training objectives.

(4) Other E3 responsibilities as deemed appropriate.

e. COMMARCORLOGBASES

(1) E3 Control Program Office (Code 841-4)

(a) Maintain an E3 control program point of contact for coordination matters required by this Order. Serves as the program manager of the E3 control program.

(b) Provide in-house support and on-site assistance to the Marine Corps on E3 matters.

(c) Maintain a historical data base for collecting, storing, and retrieving information concerning E3 related problems and solutions experienced by the Marine Corps.

(d) Ensure proper E3 control procedures are used in all depot repair; rebuild, inspect, and repair only as necessary; maintenance; testing; assembly; and installation activities.

(e) Ensure that E3 control instructions are included in all applicable technical manuals and "I" type publications under COMMARCORLOGBASES cognizance.

(f) Ensure inclusion of E3 control standards and specifications for procurement actions under COMMARCORLOGBASES cognizance.

(g) Provide technical management of the E3 test shelters.

(h) Recommend changes or additions to Marine Corps Directives, Standards, Specifications, Manuals, and Orders as necessary, and assist in identifying for procurement the test, measurement, and diagnostic equipment required for E3 testing and assessments.

(i) Provide technical assistance in E3 control matters relating to the Marine Corps Reserve.

(j) Manage the Marine Corps E3 hotline.

(k) Review E3 test data and recommend fixes regarding the E3 testing.

(l) Interface with other Marine Corps activities for use of the E3 test shelter.

(2) Marine Corps Multi-Commodity Maintenance Centers, Albany and Barstow

(a) Maintain an E3 control program point of contact for coordination of matters required by this Order. Identify the individual designated to COMMARCORSYSCOM (PSE) and COMMARCORLOGBASES (Code 841-4) as required.

(b) Provide physical storage, preservation, and security of the E3 test shelter.

(c) Provide qualified personnel to operate the E3 test shelter.

(d) Provide training for proper operation of the E3 test shelter.

(e) Properly maintain the E3 test shelter in an operational readiness condition to include upkeep of the shelter and ensure calibration of all test equipment within the E3 test shelter is accomplished.

6. Concurrence. This document has been coordinated and concurred on by COMMARCORLOGBASES, Albany; and COMMARCORSYSCOM.

7. Point of Contact. For matters pertaining to this Order, the point of contact is COMMARCORSYSCOM (PSE), DSN 278-4588/4587.

8. Reserve Applicability. This Order is applicable to the Marine Corps Reserve.

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By direction

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ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E3) DEFINITIONS

American National Standards Institute C63.14 has been adopted by DoD to serve as a standard dictionary for definitions commonly used pertaining to (E3). However, the following E3 definitions are listed for the convenience of the reader:

1. Electromagnetic Compatibility. The ability of a system or equipment to operate within design tolerances in its intended environment, with adjacent systems and equipment, and with itself.

2. Electromagnetic Environment (EME). The resulting product of the power and time distribution, in various frequency ranges, of the radiated or conducted electromagnetic emission levels which may be encountered by a military force, system, or platform in an intended operational environment.

3. Electromagnetic Interference (EMI). Any electromagnetic disturbance which interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics and electrical equipment. It can be induced intentionally, as in some forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, intermodulation products, and the like. Additionally, EMI may be caused by atmospheric phenomena, such as lightning and precipitation static and man-made non-telecommuni- cations equipment, such as vehicles and industrial machinery.

4. Electromagnetic Pulse (EMP). An intense single-phase transient electromagnetic wave that may be generated when a nuclear device is detonated or may be generated by non-nuclear means. This intense wave may damage semiconductor components and signal processing circuitry that is found in electronic and electrical equipment.

5. Electromagnetic Radiation. Radiation made up of oscillating electric and magnetic fields and propagated with the speed of light. Includes gama radiation, X-rays, ultraviolet, visible and infrared radiation, radar, and radio waves.

6. Electromagnetic Vulnerability. The undesired response of a system or equipment to the EME or the threshold above which a system or equipment may be undesirably influenced by other electromagnetic energy.

7. Electronic Protection. That division of electronic warfare involving actions taken to protect personnel, facilities, and equipment from any effects of friendly or enemy employment of electronics warfare that degrade, neutralize, or destroy friendly combat capability.

8. Electrostatic Discharge. A transfer of electrostatic charge between bodies at different electrostatic potentials caused by direct contact or induced by an electrostatic field as shown in USMC TM 9999-15/2.

9. Emission Control. The selected control of emitted electromagnetic or acoustic energy to minimize its detection by enemy sensors or to improve the performance of installed friendly sensors.

10. Hazards of Electromagnetic Radiation to Fuel. Potential for electromagnetic radiation to cause spark ignition of volatile combustibles, such as aircraft fuels.

11. Hazards of Electromagnetic Radiation to Ordnance. Under some circumstances, certain ordnance components are susceptible to malfunction, burnout, dudding, or ignition when subjected to high-intensity radio frequency fields.

12. Hazards of Electromagnetic Radiation to Personnel. Potential for electromagnetic radiation to produce harmful biological effects in humans.

13. High Altitude Electromagnetic Pulse. An EMP produced at an altitude effectively above the sensible atmosphere (approx. 120 Km).

14. Lightning. High amplitude electrostatic discharges causing irregular bursts of static in electronic system receivers.

15. Precipitation Static. Precipitation static consists of charged precipitation particles that strike antennas and gradually charge the antenna, which ultimately discharges across the insulator, causing a burst of static.

16. Radiation Hazard. Hazards caused by a transmitter or antenna installation that generates electromagnetic radiation in the vicinity of ordnance, personnel, or fueling operations in excess of established safe levels.

ELECTROMAGNETIC INTERFERENCE (EMI) HOTLINE INSTRUCTIONS

The EMI Hotline caller should have the following information available if possible:

a. Name and telephone number of person reporting EMI.

b. Type of platform, systems, or equipment that is affected.

c. Any procedure(s) appearing to be causing or aggravating the problem.

d. Brief summary of the problem or incident.

e. Has the problem been previously reported in official identifying correspondence, report, or telephone conversation? Provide the message originator and date-time-group or originator, serial number, and date when applicable.